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REMARKS

In response to the Notification, the drawings are suitably amended and the required Sequence Listing is attached. Also transmitted herewith is a copy of the Sequence Listing in computer readable form. As required by 37 CFR 1.821(e) or 1.821(f) or 1.821(g) or 1.825(b) or 1.825(d), the Applicants' Attorney hereby states that the content of the Sequence Listing, in the attached paper form and computer readable form of the Sequence Listing, are the same and the submission does not include any new matter.

The Applicant respectfully requests that any outstanding objection(s) or requirement(s), as to the form of this application, be held in abeyance until allowable subject matter is indicated for this case.

In the event that there are any fee deficiencies or additional fees are payable, please charge the same or credit any overpayment to our Deposit Account (Account No. 04-0213).

Respectfully submitted,

Michael Heydt

Michael J. Bujold, Reg. No. 32,018

Customer No. 020210

Davis & Bujold, P.L.L.C.

Fourth Floor

500 North Commercial Street

Manchester NH 03101-1151

Telephone 603-624-9220

Facsimile 603-624-9229

E-mail: patent@davisandbujold.com

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service, with sufficient postage, as First Class Mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on November 5, 2001.

By:

Michael Rogers

Print Name: Michael J. Bujold

[009]

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[AMENDMENTS MADE TO PARAGRAPH 20]**[020] Modified Surfaces/Electrodes**

| | |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| mica | Muscovite lamina, a support material for the application of thin films. |
| Au-S-(CH ₂) ₂ -ss-oligo-spacer-UQ(RC) | Gold film on mica having a covalently applied monolayer of derivatized 12-bp single-strand DNA oligonucleotide (sequence (SEQ. ID. No.: 1): TAGTCGGAAGCA). Here, the oligonucleotide's terminal phosphate group at the 3'-end is esterified with (HO-(CH ₂) ₂ -S) ₂ to form P-O-(CH ₂) ₂ -S-S-(CH ₂) ₂ -OH, the S-S bond being homolytically cleaved and producing one Au-S-R bond each. The terminal thymine base at the 5'-end of the oligonucleotide is modified at the C-5 carbon with -CH=CH-CO-NH-CH ₂ -CH ₂ -NH ₂ , this residue, in turn, being joined via its free amino group with the carboxylic-acid group of the modified ubiquinone-50 by amidation. Thereafter, the UQ is reconstituted with the remaining RC. |
| Au-S-(CH ₂) ₂ -ds-oligo-spacer-UQ(RC) | Au-S-(CH ₂) ₂ -ss-oligo-spacer-UQ(RC) hybridized with the oligonucleotide that is complementary to the ss-oligo (sequence (SEQ. ID. No.: 1): TAGTCGGAAGCA). |
| Au-S-(CH ₂) ₂ -ss-oligo-spacer-Q-ZnBChl | Identical to Au-S-(CH ₂) ₂ -ss-oligo-spacer-UQ(RC) with the exception that, instead of the RC attached via UQ, Q-ZnBChl is attached as the photoinducibly redox-active moiety. |
| Au-S-(CH ₂) ₂ -ds-oligo-spacer-Q-ZnBChl | Au-S-(CH ₂) ₂ -ss-oligo-spacer-Q-ZnBChl hybridized with the oligonucleotide that is complementary to the ss-oligo (sequence (SEQ. ID. No.: 1): TAGTCGGAAGCA). |

[AMENDMENTS MADE TO PARAGRAPH 96]

[096] Fig. 4 Shows a detailed schematic diagram of the surface hybrid Au-S(CH₂)₂-ds-oligo-spacer-Q-ZnBChl of Figure 3 having gold as the solid support material, mercaptoethanol as the spacer (-S-CH₂CH₂- spacer) between the electrode and the oligonucleotide, and -CH₂-CH=CH-CO-NH-CH₂-CH₂-NH- as the

spacer between the electron acceptor PQQ and the oligonucleotide, as well as a diagram of the sequence of the photoinduced electron transfer steps. The apoprotein of the RC is indicated only as a shell (solid line) (cf. Structure 1). The 12-bp probe oligonucleotide of the exemplary sequence **(SEQ ID NO: 1)** 5'-TAGTCGGAAGCA-3' in the hybridized state is shown in detail;

[AMENDMENTS MADE TO PARAGRAPH 98]

[098] Fig. 6 Shows a detailed schematic diagram of the surface hybrid Au-S(CH₂)₂-ds-oligo-spacer-Q-ZnBChl of Figure 5 having gold as the solid support material, mercaptoethanol as the spacer (-S-CH₂CH₂- spacer) between the electrode and the oligonucleotide, and -CH₂-CH=CH-CO-NH-CH₂-CH₂-NH- as the spacer between the electron acceptor PQQ and the oligonucleotide, as well as a diagram of the sequence of the photoinduced electron transfer steps. The 12-bp probe oligonucleotide of the exemplary sequence **(SEQ ID NO: 1)** 5'-TAGTCGGAAGCA-3' in the hybridized state is shown in detail.

[AMENDMENTS MADE TO PARAGRAPH 112]

[112] For incubation, a doubly modified 12-bp single-strand oligonucleotide having the sequence **(SEQ ID NO: 1)** 5'-TAGTCGGAAGCA-3' was used, which is esterified with (HO-(CH₂)₂S)₂ at the phosphate group of the 3'-end to form P-O-(CH₂)₂-S-S-(CH₂)₂-OH. At the 5'-end, the terminal thymine base of the oligonucleotide is modified at the C-5 carbon with -CH=CH-CO-NH-CH₂-CH₂-NH₂. Approximately 10⁻⁴ to 10⁻¹ molar 2-hydroxy-mercaptoethanol (or another thiol or disulfide linker having a suitable chain length) was added to a 2x10⁻⁴ molar solution of this oligonucleotide in HEPES buffer (0.1 molar in water, pH 7.5 with 0.7 molar addition of TEATFB, see abbreviations) and the gold surface of a test site was completely wetted and incubated for 2-24 hours. During this reaction time, the disulfide spacer P-O-(CH₂)₂-S-S-(CH₂)₂-OH of the oligonucleotide is homolytically cleaved. In this process, the spacer forms a covalent Au-S bond with Au atoms of the surface, thus causing a 1:1 coadsorption of the ss-oligonucleotide and the cleaved 2-hydroxy-mercaptoethanol. The free 2-hydroxy-mercaptoethanol that is also present in the incubation solution is likewise coadsorbed by forming an Au-S bond (incubation step).

[AMENDMENTS MADE TO PARAGRAPH 118]

- [118] For incubation, a doubly modified 12-bp single-strand oligonucleotide having the sequence (SEQ ID NO: 1) 5'-TAGTCGGAAGCA-3' was used, which is esterified with $(\text{HO}-(\text{CH}_2)_2-\text{S})_2$ at the phosphate group of the 3'-end to form $\text{P-O}-(\text{CH}_2)_2-\text{S-S}-(\text{CH}_2)_2-\text{OH}$. At the 5'-end, the terminal thymine base of the oligonucleotide is modified at the C-5 carbon with $-\text{CH}=\text{CH}-\text{CO}-\text{NH}-\text{CH}_2-\text{CH}_2-\text{NH}_2$. A 2×10^{-4} molar solution of this oligonucleotide in the hybridization buffer (10 mM Tris, 1 mM EDTA, pH 7.5 with 0.7 molar addition of TEATFB, see abbreviations) was hybridized with a 2×10^{-4} molar solution of the (unmodified) complementary strand in the hybridization buffer at room temperature for approx. 2 hours (hybridization step). After hybridization, approx. 10^{-4} to 10^{-1} molar 2-hydroxy-mercaptoethanol (or another thiol or disulfide linker having a suitable chain length) was added to the now 1×10^{-4} molar double-strand oligonucleotide solution and the gold surface of a test site was completely wetted and incubated for 2 - 24 hours. During this reaction time, the disulfide spacer $\text{P-O}-(\text{CH}_2)_2-\text{S-S}-(\text{CH}_2)_2-\text{OH}$ of the oligonucleotide is homolytically cleaved. In this process, the spacer forms a covalent Au-S bond with Au atoms of the surface, thus causing a 1:1 coadsorption of the ds-oligonucleotide and the cleaved 2-hydroxy-mercaptoethanol. The free 2-hydroxy-mercaptoethanol that is also present in the incubation solution is likewise coadsorbed by forming an Au-S bond (incubation step).